

REMARKS

In the outstanding Final Official Action, claims 1-3 and 5-7 were rejected under 35 U.S.C. 112, first paragraph. Claim 9 was rejected under 35 U.S.C. §112, second paragraph, as indefinite. Claims 1-3 and 5-11 were rejected under 35 U.S.C. §103(a) over AYRTON (U.S. Patent No. 5,741,456) in view of WO 86/02301, and further in view of TEMPLE et al. (U.S. Patent No. 6,228,311). Claims 1-3 and 5-7 were also rejected under 35 U.S.C. §103(a) over AYRTON in view of WO 86/02301. Additionally, the Restriction Requirement set forth on November 4, 2002, was maintained and made final.

Initially, Applicants again traverse the Final restriction requirement for at least the reasons set forth in the Response to Election Requirement, filed by Applicants on October 23, 2002. For example, Applicants respectfully submit that the Examiner has not established a serious burden in examining all of the identified Groups of claims. Additionally, the Examiner has not established the existence in the art of a "laser apparatus that has a converging lens that is moved in a vertical direction to the target", though he asserts such an apparatus can be used to practice the process of the elected claims. In any case, when the Examiner determines that the present application is in condition for allowance, he is encouraged to contact the undersigned to address, if necessary, the disposition of the non-elected claims.

Upon entry of the present amendment, claims 1, 5 and 8-9 will have been amended. In particular, claim 1 will have been amended to recite an approximate interval between pulses. See, e.g., p.6, lines 10-13. Additionally, claim 5 will have been amended to recite a minimum interval between pulses. See, e.g., p.6, line 24 to p.7, line 2. Furthermore, each of the independent claims has been amended to recite drilling through all layers of the material using a laser at a first energy. Additionally, the limitations that relate to the approximate ranges of ratios between first and second energies of the pulses, have been deleted

Applicants traverse the rejection of claims 1-3 and 5-7 under 35 U.S.C. §112, first paragraph, and respectfully assert that the rejection is moot in view of the deletion of the features that relate to the range of ratios between first and second energies of the pulses. However, Applicants additionally respectfully submit that the rejection of the claims under 35 U.S.C. §112, first paragraph, was inappropriate. However, the objected-to features of the independent claim have been cancelled in order to advance prosecution of the present application. Accordingly, Applicants respectfully request reconsideration and withdrawal of each of the rejections under 35 U.S.C. §112, first paragraph.

Applicants traverse the rejection of claim 9 under 35 U.S.C. §112, second paragraph. In particular, Applicants have amended claim 9 to recite the "second energy being vented through the initial hole". In this regard, Applicants respectfully submit that the previously

recited features of claim 9 would have been understood by one of ordinary skill in the art. Furthermore, Applicants respectfully submit that the assertion that it is unclear as to whether energy is being vented or a gas is being vented is inappropriate, at least because the two are not mutually exclusive. However, in order to advance the prosecution of the present application, Applicants have amended claim 9. Accordingly, Applicants respectfully submit that reconsideration and withdrawal of the rejection of claim 9 under 35 U.S.C. §112, second paragraph, is now proper.

Applicants traverse the rejection of claims 1-3 and 5-11 under 35 U.S.C. §103(a) over AYRTON in view of WO 86/02301, and further in view of TEMPLE et al. Initially, Applicants submit that AYRTON discloses that the layer ("1") is "formed from carbon fiber strands which are formed into sub layers and laid on top of each other" (see col. 2, line 66 to col. 3, line 3). Due to the structure and/or treatment of the layers described in columns 2 and 3, the layer is not "prone to delamination" (see col. 3, lines 15-18).

Incidentally, Applicants note that the above-noted layer of AYRTON is similar to a feature in an embodiment of the present invention. In particular, the layer positioned at the middle of the sheet-like material in the present invention (see Figs. 3A-3C) has three layers. The middle layer is formed such that a sheet made of polyethylene terephthalate is fused on both sides of a substrate (see p. 3, line 24 to p. 4, line 2).

Aside from the above similarities, AYRTON does not disclose or suggest the combination of features recited in the present claims. In particular, AYRTON does not disclose or suggest the use of multiple pulses or pulse trains having different energies to prevent delamination during drilling. Moreover, AYRTON does not disclose or suggest any timing between pulses, even if multiple pulses were somehow used. In any case, as has been previously explained by Applicants, AYRTON avoids delamination without any of the features of multiple pulses or pulse trains having different energies.

Furthermore, Applicants respectfully submit that there is no motivation provided in AYRTON to modify the disclosure thereof. In this regard, the outstanding Official Action asserts that "the reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem". Applicants respectfully submit that the Examiner's application of the above-noted quotation of the MPEP is incorrect. In particular, taking the above-noted quotation to be correct, its application to the present invention is improper. In particular, AYRTON discloses the *same problem* as the present invention (*i.e.* inter-layer delamination), but teaches a *different solution* (changing the composition of the material) by decreasing the density of the resin. In any case, the problem is solved in AYRTON. Accordingly, there is no motivation provided therein to modify the disclosure thereof in order to solve the solved problem in a dramatically different fashion. Yet, such a modification is exactly what is proposed by the Examiner.

Furthermore, Applicants respectfully submit that the outstanding Final Official Action does not satisfy the requirements for an obviousness rejection as previously set forth by the Court of Appeals for the Federal Circuit. In particular, the Court of Appeals for the Federal Circuit has previously determined that "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification". See *In Re Fritch*, 23 USPQ2d 1780, 1784. In this regard, Applicants respectfully submit that the Examiner has not stated any manner in which the teachings of AYRTON "may be modified" such that the invention recited in the present claims would be obvious, let alone set forth a suggestion of "the desirability of the modification[s]".

The Examiner asserted that it would be obvious to combine WO 86/02301 and AYRTON because both references solve "the similar problem of delamination of a multi-layered sheet while drilling holes therein." However, as has been previously noted by Applicants, each reference explicitly discloses that delamination is prevented, so there is no need to improve either reference, at least for purposes of preventing delamination. Likewise, there is no motivation to combine TEMPLE et al. with AYRTON or WO 86/02301.

Furthermore, Applicants again submit that WO 86/02301 does not disclose or suggest drilling an initial hole through all layers of a multi-layer material using a laser (or pulse train)

at a low power and then drilling a larger diameter hole through all layers at a higher power.

Rather, WO 86/02301 discloses, at page 7, lines 4-14:

"For laminated materials, such as printed circuit boards, a train of low-power pulses can be used to drill through the *initial metallic layers*. The low pulse power prevents delamination of the metallic layer. After the metallic layer has been pierced, higher-power pulses can be used to drill through the underlying insulating board. Finally, at the far end of the hole, low-power pulses can be used to drill through the opposite metallic layer, again to prevent delamination."

Accordingly, Applicants respectfully assert that WO 86/02301 does not teach drilling a hole entirely through multi-layered material at a low power, followed by widening (or trimming) the hole at a higher power, as in the present invention.

Additionally, Applicants submit that AYRTON does not disclose or suggest the timing between pulses that is recited in each of the independent claims. Accordingly, to teach the features of the presently recited invention, AYRTON would have to be modified to not only provide pulse trains with different energies, but also to provide specified timing between the different pulse trains. AYRTON discloses neither. Nor is there any motivation to modify AYRTON to teach these features. Accordingly, not only does AYRTON not disclose the present invention, or provide a motivation for modification thereof to teach the features recited herein, but there would be motivation not to modify AYRTON in the first place given

the extensive modifications that would be required without obtaining any particular benefit. In particular, AYRTON does not disclose or suggest the use of multiple pulses, let alone the timing between pulses.

Accordingly, Applicants respectfully assert that neither AYRTON or WO 86/02301, singly or in combination, discloses or suggests the combination of features recited in the claims of the present application. Applicants respectfully assert that there is neither a showing by the Examiner of the manner in which the teachings of AYRTON may be modified, or a showing of where in the prior art a suggestion to make such modifications is contained.

Applicants traverse the rejection of claims 1-3 and 5-7 under 35 U.S.C. §103(a) over WO 86/02301 in view of TEMPLE. In this regard, Applicants respectfully submit that neither WO 86/02301 or TEMPLE disclose or suggest "drilling through all layers of the material by at least one laser pulse having a first energy" as is recited in, e.g., claims 1 and 5. Rather, as is previously noted, WO 86/02301 specifically discloses that the "low-power pulses can be used to drill through the initial metallic layers". Furthermore, TEMPLE et al. is directed to trimming a drilled hole in metal to form a nozzle. Accordingly, neither WO 86/02301 nor TEMPLE disclose or suggest the above noted features of, e.g., claims 1, 5 and 8.

Applicants further submit that there is no proper evidence of motivation to combine WO 86/02301 and TEMPLE. In this regard, the outstanding Final Official Action asserts that "it would have been obvious for one of ordinary skill in the art to have provided a second train of high-power pulses to trim said drilled hole as taught by TEMPLE". However, there is no suggestion in WO 86/02301 that a hole needs to be trimmed.

Additionally, as relied upon by the Examiner, WO 86/02301 discloses using a low pulse power to drill through an initial metallic layer, which prevents delamination of the metallic layer, and using a higher pulse power to drill through an underlying insulating board layer. See, e.g., page 7, lines 5-6. There is no disclosure of using different energies of laser pulse trains to both drill a hole through the multi-layered material and to subsequently trim the through-hole at a higher power. Furthermore, given the use of high-power pulses already, WO 86/02301 does not suggest a reason to use them in the manner asserted by the Examiner. Accordingly, Applicants again respectfully assert that there is no motivation to combine the references applied by the Examiner. Accordingly, withdrawal of the rejection under 35 U.S.C. § 103(a) based on the combination of WO 86/02301 and TEMPLE is respectfully requested.

With regard to claims 2-3, 6-7 and 9-11, Applicants assert that they are allowable at least because they depend from independent claims 1, 5 and 8, respectively, which the Applicants submit have been shown to be allowable.

In view of the herein contained amendments and remarks, Applicants respectfully request reconsideration and withdrawal of previously asserted rejections set forth in the Final Official Action of April 22, 2003, together with an indication of the allowability of all pending claims, in due course. Such action is respectfully requested and is believed to be appropriate and proper.

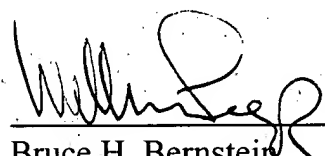
Entry of the present amendment is believed to be proper, even though the present application is subject to final rejection. That is, numerous of the present amendments clarify features of the claimed invention that the Examiner has asserted are unclear or unsupported. Additionally, numerous of the present amendments clarify features that Applicants have previously argued are not disclosed or suggested by the references applied by the Examiner. Thus, the present amendment clearly places the application into condition for allowance.

SUMMARY AND CONCLUSION

Any amendments to the claims which have been made in this amendment, and which have not been specifically noted to overcome a rejection based upon the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attached thereto.

Should the Examiner have any questions concerning this Reply or the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,
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